Mth 86 Crucial Prerequisites **NAME**

After review, place a checkmark next to those outcomes you feel you understand and/or are proficient with. Place a question mark next to those outcomes which you feel your skills/understanding is questionable.

To be successful in Mth 86 you should (know) be able to …

Arithmetic-Algebra

1. Know the basic vocabulary of mathematics at the elementary algebra level. e.g. linear equation, distribute, etc
2. Know the common abbreviations in mathematics at the elementary algebra level. e.g. LCD, $\approx$, $\neq$, π, ft, in, rpm, etc
3. Use *order of operations* to perform extended calculations with parentheses, exponents, radicals.
4. Evaluate expressions/formulas using substitution. e.g. $c = \sqrt{a^2 + b^2}$; $a = 3$, $b = 4 \rightarrow c = 5$
5. Plot/read (x, y) coordinates on a graph.
6. Interpret the behavior inherent in a graph.
7. Add/subtract/multiply divide units of measurement. e.g. 4' 3 ⅜" + 5' 9 ¾"; 4' 3 ⅜" × 5' 9 ¾"
8. Change between alternate units of compound measurement. e.g. cfs → gpm; cu-in/hr → cu-ft/sec
9. Convert decimal feet to feet-inches-16ths of an inch. e.g. 4.7865 → 4' 9 7/16"
10. Solve linear equations.
11. Solve literal equations (rearrange formulas).
12. Solve basic radical equations. e.g. Solve $10\sqrt{x + 3}\ 16 = 56$ for x
13. Solve basic quadratic equations. e.g. Solve $10(x + 3)^2 - 16 = 56$ for x
14. Switch between algebraic forms and text forms. e.g. the base is twice the height → $B = 2H$

Geometry

1. Know and use the terminology of geometry. e.g. right angle, parallel, DMS, supplement
2. Convert among angle representations. bearing ↔ azimuth ↔ θ-angle ↔ radians ↔ revolutions
3. Switch between DMS and decimal degrees. e.g. 50.6750° = 50° 40' 30"
4. Convert multiple revolutions to principle angle. 780° → 60°
5. Find missing circle dimensions from partial information.
6. Compute entire (or partial) area or circumference of a circle.
7. Solve applications involving circles.
8. Apply rules of complements, supplements, etc to find missing angles from partial information.
9. Use the Pythagorean Theorem in 2-D and 3-D applications.
10. Use similar triangles in geometric applications.
11. Switch between pitch ↔ slope ↔ grade.
12. Use slope in geometric applications to find missing measurements.
13. Find the area or volume of complex shapes. Includes Heron's and Polygon-Fit formulas.

Writing and Working in a Group

1. Effectively communicate mathematical concepts in writing using correct mathematical notation.
2. Work collaboratively with your peers on projects or activities to explore mathematical concepts.

Some Sample Problems

1) Find the slope of the line through (5, -19) & (-27, 5) as a decimal, a fraction, a pitch and a grade.

2) Solve for x: $\dfrac{2x-4}{3} + 5 = 12 - \dfrac{5x-7}{2}$

3) Solve for y: $\dfrac{4x+5y}{2} = 4 - \dfrac{y}{3}$

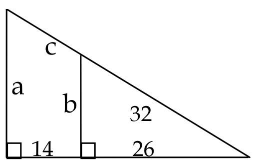
4) Solve for y: $\dfrac{4y-3x}{2} = 1$

5) Solve for x: $ax + bx = c$

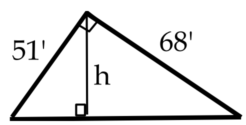
6) Convert 5000 rpm to deg/sec

7) Convert 80 mph to fps

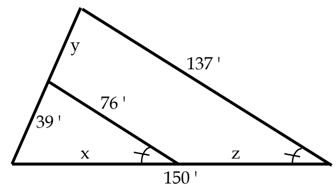
8) Find a, b & c



9) Find h.



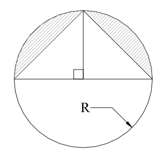
10) Find x, y, z



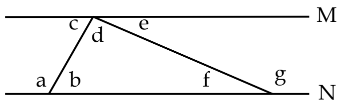
11) Find the circumference and area of a circle with a 5" radius.

12) How much weight (lbs) will be removed if 6 holes (with dia $2\frac{3}{8}$") are drilled in a 6" × 10" steel plate weighing 100 lbs?

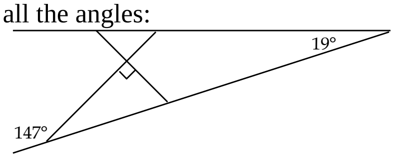
13) Find the shaded area 'A' as a function of r.



14) M ||N. g = 142°. d = 97°. Find the remaining angles



15) Find all the angles:

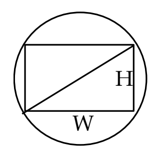


16) Using only W = width of rectangle, H = height of rectangle and R = radius of circle. Write functions for:

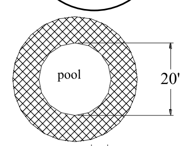
(a) The area of the rectangle: A_{rect} =

(b) The area of the circle: A_{circle} =

(c) The diagonal of the rectangle (the diameter of the circle): D =



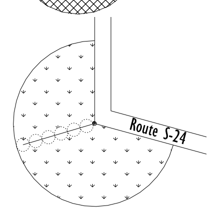
17) There are 560 ft^2 of tile available to cover a circular walkway around a 20 ft diameter pool. How wide a walkway will that make?



18) The pivot arm (radius) is 480'. Route S-24 make a 105° turn. 43,560 ft^2 = 1 ac.

(a) Find the area (in acres) watered by this pivot irrigation system.

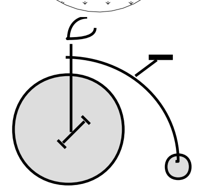
(b) If you walked the curved perimeter of the field how far would you walk?



19) The large wheel has a 3' diameter and the small wheel has a 8" diameter.

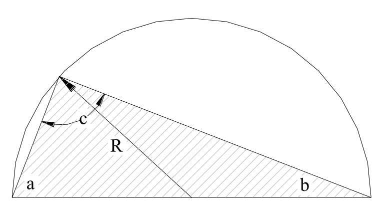
(a) How many degrees will the large wheel turn when the small wheel rotates exactly once?

(b) How far will the bike move if the front wheel rotates twice?



20) Prove algebraically that the shaded triangle is a right triangle.

Hint: First show that there are two isosceles triangles.



1) (a) $m = -3/4 = 0.75$, (b) $P = -9/12$ pitch, (c) $G = -75\%$ grade

2) $x = 71/19$

3) $y = \dfrac{24 - 12x}{17}$

4) $y = \dfrac{2 + 3x}{4}$

5) $x = \dfrac{c}{a + b}$

6) 30,000 deg/sec

7) ≈ 117 fps

8) $a \approx 28.70$, $b \approx 18.65$, $c \approx 17.23$

9) $h = 40.8$ ft

10) $x \approx 83.21$, $y \approx 31.30$, $z \approx 66.79$

11) $A = 25\pi \text{ in}^2$, $C = 10\pi$ in

12) 44.30#

13) $A = A_{semicircle} - A_{triangle} = \frac{1}{2}\pi R^2 - R^2$

14) a = 135°, b = 45°, c = 45°, d = 97°, e = 38°, f = 38°, g = 142°,

15) Counterclockwise: 142°, 38°, 52°, 128°, 19°, 123°, 57°, 33°, 147°

16) (a) $A_{rect} = WH$, (b) $A_{circle} = \pi R^2$, (c) $D = 2R = \sqrt{W^2 + H^2}$

17) 6.68 ft

18) (a) 4.8 ac, (b) ≈ 880 ft

19) (a) 80°, (b) 6π ft

20) Adding R shows both triangles are isosceles so the missing angles at c are a & b.

Hence, $2a + 2b = 180°$ or $c = a + b = 90°$.